

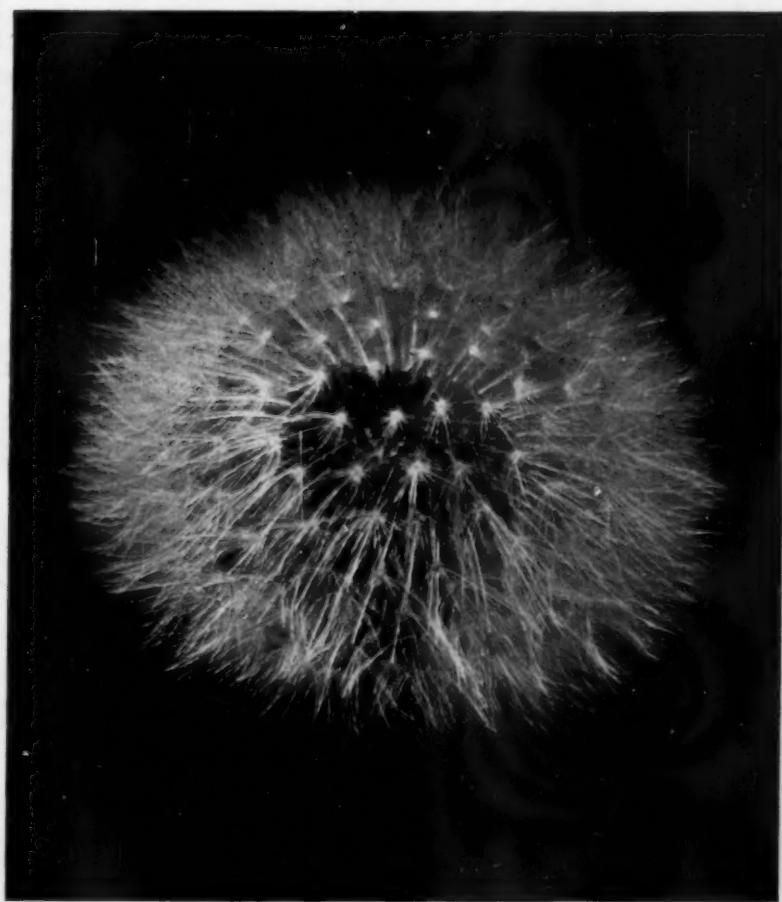
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



JULY 7, 1934

Fireworks in Fairyland

See Page 7

A

SCIENCE SERVICE PUBLICATION

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Summary of Science

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DO YOU KNOW?

Our word calculate comes from the old practice of using pebbles, called in Latin "calculi," in counting.

A hoard of 26,000 ancient bronze coins was recently discovered stored in what appears to have been an Egyptian bank at Karanis.

There is no foundation for the belief that sour cream contains more butterfat; and, in fact, only butter of inferior quality can be made from it.

A welded joint for rails, which holds the rails tight and yet is flexible enough to allow for expansion and contraction, has been invented in Stockholm.

Two British trucks recently traveled the 3,000 miles from Haifa to Kabul cheaply, using gas generated from charcoal in place of the usual gasoline.

The largest granite monoliths in the world are El Capitan and Half Dome, in the Yosemite Valley in California.

Tuberculosis is killing the Indians at seven times the white man's rate, says Commissioner of Indian Affairs John Collier.

The subway now being built in Moscow is to carry passenger traffic from the center of town to the suburbs in ten directions.

Not only are one-third of the Tibetan male population priests, but there are also large numbers of unmarried women who serve as nuns in convents.

Canada has begun a strong fight on mosquitoes this summer, knowing that heavy snows of the past winter would produce breeding grounds for the pests.

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PHYSIOLOGY

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What is it in pollen that causes hay fever? p. 6.

PSYCHOLOGY

What is personality? p. 14.

What sugar is bitter? p. 9.

PUBLIC HEALTH

What is Nature's safeguard against infant mortality? p. 8.

SEISMOLOGY

How are artificial earthquakes created? p. 8.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but the references for further reading. Books cited can be supplied by Book Department, Science News Letter, at publishers' prices, prepaid in the United States.

GENETICS

Sex Control Succeeds With Warm-Blooded Animals

Injection of Female Sex Hormone into Chick Embryos Increases the Ratio of Females to Males

ONE of the first apparently successful attempts at experimental sex control of warm-blooded animals has just been reported from the Indiana University zoological laboratories.

Through injection and absorption of female sex hormones into more than 900 chick embryos, experimenters have been able to change the normal sex ratio of about 50 per cent. females to 64.78 per cent. females. With more complete control of experimental conditions, it seems possible theoretically to control almost without exception the sex of the embryos.

This means sex reversal from male to female through artificial control. The next step in the experiment will be to attempt the more difficult change from female to male.

The possibility of experimental sex control has long been a subject of scientific investigation. Sex reversal has been accomplished experimentally in amphibians and other cold-blooded animals but has baffled science in its efforts on warm-blooded species, although Prof. F. A. E. Crew of the University of Edinburgh has reported a female fowl which laid eggs and later produced sperm.

Working for the past two years on the general problem of the effect of endocrine gland preparations on the development of the chick embryo, Indiana University investigators developed a theory of sex control through injection of sex hormones.

They took advantage of the known fact that the gonads or sex glands of the chick embryo are practically identical so far as structure is concerned until about the sixth day of development. At that time sex differentiation occurs.

Injection of hormones was started on the third or fourth day, when theoretically the gonad could be changed. The extract was inserted into the air chamber of the large end of the egg. Absorption was accomplished through the allantois of the embryo, a vascular membrane which takes up the extract.

The heavy percentage of females developing from the artificially treated embryos, as compared with the normal 50-50 ratio, seems indicative if not a proof of sex reversal. In answering the question of why the 900 embryos of the experiment showed any males at all, it is explained that the allantois or absorbing tissue of many males develops so late that the extract of female hormones is not absorbed under the present experimental methods.

Another reason for failure to bring about complete sex reversal is that the shell membranes in many cases are so dry as to absorb all of the extract before it reaches the allantois of the embryo. With complete control of experimental conditions, it should be theoretically possible to effect a complete sex reversal.

In normal development, sex is thought to be determined by the presence of certain definite bodies called

chromosomes, within the cells of the individual. A definite chromosome difference exists between the male and female sexes, but just how the chromosomes produce their effects is unknown. Granted that the chromosomes do play a part in sex differentiation, such effects are not wholly independent of environmental conditions.

Continuing the injections after sex differentiation has taken place in the chick embryo, experimenters have found that the extract of female hormones produces an abnormality in the male glands, but that the change is not sufficient to produce reversal, once sex differentiation has definitely developed.

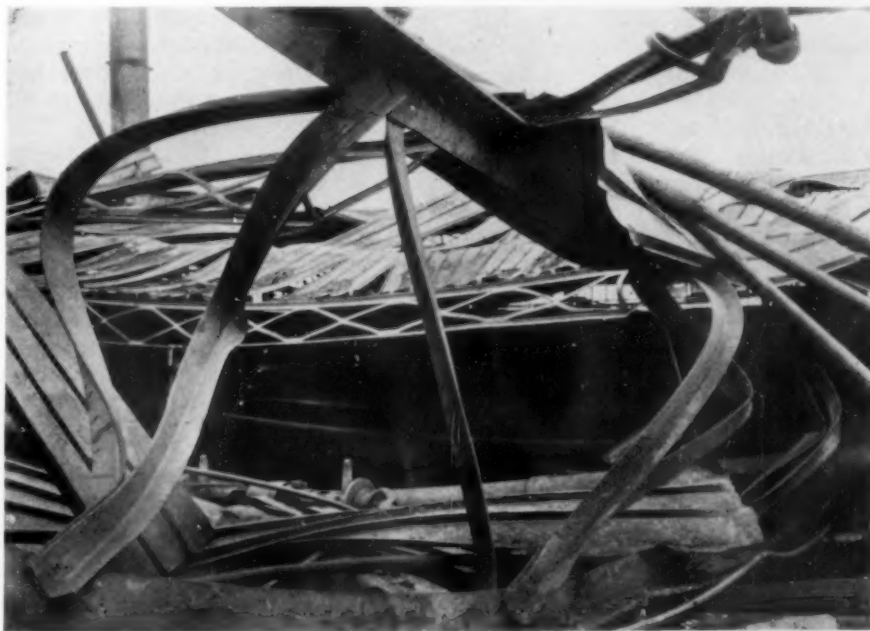
Science News Letter, July 7, 1934

PHYSICS

Find Second Way of Making Radioactive Nitrogen

A NEW way of producing radioactive nitrogen by bombarding boron with the cores of helium atoms has just been reported to the British science journal *Nature* by the Russian scientists A. J. Alichanow, A. J. Alichanian and B. S. Dzelepov, of the Physical Technical Institute, Leningrad.

The supposed atomic reaction which brings about the creation of the radioactive nitrogen by artificial means is: five atoms of boron of mass 10 plus



SPIDER OF STEEL

This contorted mass of steel, resembling an octopus or huge tarantula is all that is left of a factory after it was devastated by an oil explosion and a subsequent fire. The joints, welded by the electric-arc process in 1932, remained unbroken.

two atoms of helium of mass 4 produces seven atoms of nitrogen of mass 13 plus one positron.

The work is another step in making the disintegrating, special kind of nitrogen already produced in America in a different way. Drs. R. Crane and C. C. Lauritsen of California Institute of Technology created artificial radioactive nitrogen by shooting deuterons at carbon. The probable reaction for the California work is thought to be: six atoms of carbon 12 plus one deuteron 2 produce seven atoms of nitrogen 13 plus a positron.

Ordinary nitrogen as found in the air has atomic number 14; the radioactive kind has number 13.

The rate at which the special nitrogen is disintegrating, with an emission of a positron, was measured by the Russian scientists. Its "decay" curve, they say, is substantially the same as that measured in America for the nitrogen created by the deuteron-impact method.

"Thus," they conclude, "starting both from boron and carbon one gets the same kind of radioactive nitrogen N 13 with the same characteristic constants."

Science News Letter, July 7, 1934

OCEANOGRAPHY

New World Record Found For Height of Daily Tide

SCIENTIFIC explorers are still discovering record-breaking features of world geography.

Russian investigators have just found that the greatest daily tide in the world rises and falls in the Okhotsk Sea, the huge crook in the northeast coast line of Asia. At least, the Okhotsk Sea will hold the record unless some unsuspected shore line elsewhere turns out to have even greater tide.

There are not many places in the world where the tide rises and falls once in 24 hours, instead of regularly following the usual two-a-day schedule. Such tides occur at certain places on the Gulf Coast, in Alaska, the Philippines, the coast of China and a few other scattered localities, says H. A. Marmer, specialist on tides of the U. S. Coast and Geodetic Survey, reporting the Russian discovery to the *Geographical Review*.

Daily tides heretofore known have not been impressive in size. The famous Bay of Fundy tides, which are the standard of greatness, rise mountain-like to forty feet or more, but these rise and fall in orthodox fashion twice each day. The known range of the tides that flow in and out only once a day has been only a few feet at most.

The newly-discovered daily tides of the Okhotsk Sea, however, form waves of notable size. In the month during which the Russian Hydrographic Department made tidal observations at Cape Astronomichesk, at the northeastern head of the Okhotsk Sea, the daily tide on one record-making occasion had

a range of 37 feet.

On only a few days during the month did the Russians find two high and low waters occurring at this part of the seashore. The more usual occurrence was a single daily tide, averaging fully 28 feet.

As scientists have ranged farther afield in their investigation of tides, they have become increasingly aware that their early ideas about tides were too simple. Those early theories were based on studies along the Atlantic coast, and the response of the water there to sun and moon forces was taken to be typical. On the contrary, as Mr. Marmer has pointed out, there are many varieties of tides found at different shores. The morning tide may rise higher or faster, or it may ebb slower than, or not so far as, the afternoon tide, thus varying the pattern. There are daily tides, semi-daily, and mixed.

The charting of the tides with an understanding of all these varieties is a matter of practical importance to navigators, harbor masters, and engineers.

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MEDICINE

Infantile Paralysis Vaccine Being Tried in New York

FIRST TRIALS of a vaccine which it is hoped will give children protection against dreaded infantile paralysis are now being made.

It will be several weeks before the value of the vaccine for humans is

known, but it has already made monkeys immune to the virus of infantile paralysis.

A description of the vaccine and the results with monkeys were given by Dr. Maurice Brodie, of New York University and Bellevue Hospital Medical School, in a report to the journal, *Science*.

The vaccine is made from the active virus which causes infantile paralysis. This virus is inactivated or made non-infective by treating it with formalin. After this inactivated virus is injected into monkeys, the animals' blood shows substances called antibodies which indicate that they have developed resistance to infantile paralysis virus and are probably immune to the disease.

"It is too early to use the vaccine in California," Dr. Brodie said when questioned about its possible usefulness in protecting children from the epidemic now occurring in that state.

Latest reports to the U. S. Public Health Service in Washington indicate a slight further increase in the epidemic. There were 340 new cases of infantile paralysis in California for the week ending June 23. Thirty-six more cases were reported from the rest of the country for that week. New York reported 8 cases, Florida 6, and Alabama 5; the other states reported only one or two cases each.

Science News Letter, July 7, 1934

ECOLOGY

Mild Winter and Drought Menace Park Animals' Range

THE MILD winter of 1933-34 in the western National Park area may be of doubtful value from the standpoint of the wild animals. Not only was the weather much milder than usual throughout the entire northern range, but the snowfall was much less heavy than in former years. As a result, the animals wintered well and sought the higher altitudes much earlier than usual this spring.

Unfortunately, however, there is cause for concern in the drought conditions that have followed the mild winter, and fear is expressed by park officials that should a hard winter follow these drought conditions the wild animals may suffer severely. A mild winter always means less forage produced, greater utilization of the range, and a higher birth rate among the wild animals, thus complicating the situation.

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ASTRONOMY

Jupiter and Saturn Have Atmosphere of Deadly Gas

Life Would be Impossible There as On Outer Planets, Mars is Only Hope, Arizona Astronomers Conclude

LIFE on the other planets, with the possible exception of Mars, is absolutely impossible. This has been shown by observations at Lowell Observatory on Jupiter and Saturn which show their atmospheres to consist largely of methane and ammonia, deadly gases not widely found in nature here on earth.

Dr. V. M. Slipher and Arthur Adel of the Lowell Observatory, Flagstaff, Ariz., have clinched the argument by use of evidence gathered by planetary spectrum photographs taken through telescopes and laboratory spectra of the gases.

Ammonia is the familiar stifling, strongly odorous gas, and methane is the deadly hydrocarbon gas often called firedamp or marsh gas. Violent explosions in coal mines result from methane. Ammonia is used in artificial ice machines. The atmospheres of Jupiter and Saturn may be visualized as like the interior of a gassy mine mixed with an exploded ice factory, all at the immensely low temperature of some 220 degrees below zero Fahrenheit.

If an earth creature could take an impossible Jules Verne trip to ringed Saturn or enormous Jupiter, the great cold and the deadly gases would snuff out his life. And if oxygen were taken along for breathing purposes, there would be a terrific explosion as soon as it arrived. This fact is proof that no oxygen exists upon the two planets.

Although Uranus and Neptune, the two planets next beyond, are too distant and small to allow as detailed telescopic inspection, their light makes the astronomers feel sure that they too have methane-ammonia atmospheres, with no possibility of life. This eliminates four out of nine planets as abodes of life.

Pluto, most distant and most recently discovered planet, is without atmosphere because like the earth's moon, and Mercury, the sun's nearest neighbor, it is too small and has too little gravity to hold onto gases.

Venus, with much atmosphere, can

not have life unless it is an extremely strange sort that would exist without water or oxygen and thrive upon carbon dioxide, the waste product of respiration here on earth.

Mars is the best bet for life elsewhere in the solar system because it has visible clouds somewhat similar to those on the earth. The question of the existence of life-supporting oxygen is in dispute. It has water, but less than on earth. There seem to be seasonal changes. The temperatures vary from about 65 to 70 degrees Fahrenheit at midday to far below zero at night. Man could not live under such conditions, but some sort of odd lichens or fungi or strange Martian germs might.

The ammonia-methane composition of the atmosphere of the giant and distant

planets was first hinted over two years ago by computations of Dr. Rupert Wildt of Goettingen, Germany, using Lowell Observatory spectrographic observations. More recently, Dr. Theodore Dunham, Jr., of Mt. Wilson Observatory demonstrated conclusively the existence of ammonia.

Dr. Slipher used the rich photographic data of Lowell Observatory, which specializes on observations of the planets. These he compared with laboratory work at the University of Michigan on the way light is affected by high concentrations of methane. This gas was compressed so greatly that the light has a path equivalent to over a mile in length.

It is possible that Jupiter and Saturn may not have solid surfaces. Because of the great cold upon them the ammonia gas may freeze out in beautiful white crystals. One theory is that the different light-colored markings upon the two planets are due to great geyser-like wellings of the sub-frigid ammonia crystals.

The idea that the gigantic disturbances on the surfaces of Jupiter and Saturn are periodic and are in some way set off by the same unknown cause that influences the sunspots and the aurorae of the earth is advanced by Dr. E. C. Slipher, of Lowell Observatory,



IN A MUSEUM NOW

The horse, or a statue of one, has already found its way to the museum. The sculpture by Herbert Hazeltine, made one-fourth life size in bronze plated with gold and ornamented with lapis lazuli, ivory, and onyx, is one of a group of British champion domestic animals recently placed on exhibit at the Field Museum of Natural History. It is the portrait of Sudbourne Premier, a Suffolk Punch stallion.

the other of a pair of brother astronomers. Studying intensively the markings on Jupiter, he finds that they have a periodicity of about eight years and that they correspond somewhat to variations in the sunspots and the prevalence of earthly northern lights.

The great spot on Saturn that appeared Aug. 3 of last year and subsided

by November was the second such immense storm on the planet so far discovered. Only a similar spot in 1876 was as large. The earth could have been swallowed up in the 1933 Saturn spot, for it was fifty thousand miles long and some twelve or fifteen thousand miles wide.

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PHYSIOLOGY

Many More Gland Secretions Still Awaiting Discovery

A VAST number of gland secretions capable of influencing the human body in a multitude of ways will be discovered in the future, Prof. Vincent du Vigneaud, George Washington Medical School, Washington, D. C., predicted in a report to the American Association for the Advancement of Science.

Already more than a dozen of these hormones are known. Six have been isolated in pure crystal form and two of them, epinephrine and thyroxine, have been manufactured in the chemical laboratory with entire satisfaction. Like vitamins, only very small amounts of hormones are required to produce large effects.

In tearing the hormones apart chemically in hope of discovering their composition, remarkable relationships among substances in the body have been found, Prof. du Vigneaud explained, for example, that the female sex hormone shows relationship to the male sex hormone, to a bile acid, to cholesterol, to ergosterol, to the sunshine vitamin D, to strophanthin (a drug used as a heart tonic), and even to the substance in coal tar which causes certain types of cancer through chronic irritation of the skin.

May Be Proteins

It may turn out, Prof. du Vigneaud hinted, that certain of the hormones may actually be proteins. The idea has been held by some that the peculiar properties of certain of these gland secretions are due to chemical groups attached to the foundation molecule of the protein, but Dr. du Vigneaud's suggestion is that certain protein-like hormones have their powerful effects because of the nature of the whole chemical substance itself and that this sub-

stance is really what is called a protein. Thus, insulin promotes the use of sugar in the blood because it is a protein and not due to a foreign group attached to it. Typical proteins are the substances in pollen that cause hay fever and the enzymes in plants and animals that speed up reactions in the body. Proteins, in turn, are known to consist of combinations of some twenty-one amino acids, some of which are necessary to life. Protein has been best known as one of the old triumvirate of food factors, being a dietary triplet with fats and carbohydrates.

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SEISMOLOGY

Two Earthquakes Shock Mexico and Chile

THE WEEK-END of June 23-24 was marked by a pair of earthquakes, both apparently in the Latin-Pacific area.

Data gathered telegraphically by Science Service and interpreted by the Jesuit Seismological Association and the U. S. Coast and Geodetic Survey indicated that a shock of moderate severity occurred at 1:33.8 on Saturday morning off the west coast of Mexico, near the State of Colima, in latitude 18.5 degrees north, longitude 105 degrees west.

Similar data, interpreted by the U. S. Coast and Geodetic Survey, suggested that the second quake, which occurred at one o'clock on Sunday morning, had its epicenter somewhere in the Chilean region; but whether on or off shore the information received was insufficient to indicate with certainty. It was a deep-focus earthquake, that is, the rock-slip that started the tremor was located far beneath the surface of the earth.

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GENERAL SCIENCE

Pressing Problems of Science Listed by SAB Chairman

PRAISING the scientific spirit in which President Roosevelt and his new deal is tackling its problems, Dr. Karl T. Compton, chairman of the U. S. Science Advisory Board and president of the Massachusetts Institute of Technology, in a recent address to the American Association for the Advancement of Science said that a return to the old regime desired by conservatives would be "as silly as for a scientist to repeat an experiment which proved unsuccessful."

The proven path of progress is the scientific method intelligently applied, Dr. Compton said, "whether in the hands of Democrats or Republicans, Kings or Soviets, scientists or laymen."

He held that President Hoover, like a good engineer, started out to ascertain the facts through a group of fact-finding commissions, but that political conditions and the breakdown of our unstable economic system, caused by years of unintelligent enjoyment of a fools' paradise, prevented progress of the Hoover program.

Five pressing problems that challenge science were cited by Dr. Compton: 1. Unemployment, which can be remedied by science by creating new industries. 2. Wise use of natural resources, including land and minerals. 3. Hereditary weaknesses, both mental and physical, that constitute a tremendous drain on happiness and finances. 4. Sickness, which despite the advances of medicine still takes enormous toll. 5. Crime.

"It is too much to hope that the Devil will be banished from the face of the earth, but science can certainly help to reduce the number of his followers," Dr. Compton said.

To allow science to continue to do its part for national welfare, Dr. Compton said that a general tax to support scientific research would be preferable to a special tax on industries. The cost of great achievements, such as the eradication of yellow fever, has been only the equivalent of a few battleships, and Dr. Compton raised the question "as to whether such examples do not suggest a more beneficial distribution of government expenditure."

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Parsons, West Virginia, is trying to get all home owners to plant flame azaleas, as the floral badge of the town.

ENGINEERING

200 Years to Cool Boulder Dam if Not Refrigerated

THE ENORMOUS amount of heat generated by the setting of the concrete in Boulder Dam would take over 200 years to leave the structure if it were not dissipated by artificial means.

When concrete sets, the slow chemical reaction that takes place gives off a large amount of heat. Researches by the U. S. Bureau of Reclamation have determined that in the case of the \$71,000,000 Boulder Dam enough heat would be generated in the 6,500,000-ton block of concrete to melt a cube of ice as high as a 24-story building.

In order to refrigerate this tremendous concrete plug between the walls of Black Canyon on the Colorado River, it is being riddled with coils of pipe as each section of cement is poured. This calls for the inclusion of some 580 miles of tubing, all of which will be left in place after the cement has hardened. But for this refrigeration, great damage, involving the possibility of dangerous cracks, would take place during a protracted cooling and shrinking period.

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A MODERN AMERICAN'S "IGLOO"

An exact replica of the hut which keeps Admiral Byrd warm against Antarctic blasts is now on exhibit at the Century of Progress. This tiny home, small enough to be carried by airplane, is kept warm by the same device that keeps modern refrigerators cold—paper-thin layers of aluminum foil separated by air spaces. The walls are made in panels to facilitate transportation. Each panel consists of layers of canvas, white pine veneer, paper, the aluminum foil, more paper, kapok, and repetitions of some of these layers, with plenty of air spaces interspersed. If pressed together, the materials in the walls would be only an inch and a quarter thick, yet the walls are actually four inches thick. The whole house is just the size of an automobile crate.

PHYSICS

Don't Forget 137th Dimension Eddington Warns Scientists

PROFESSOR ALBERT EINSTEIN with his relativity theory brought the fourth dimension into everyday vocabulary and therewith raised a hurdle for "run-of-the-mind" American intelligence which is still something of a puzzle to a three-dimensional world.

Laymen (and also more than a few scientists) who had difficulty struggling with the fourth dimension will find a new problem for them in the report of the distinguished British scientist, Sir Arthur A. Eddington, to the science journal *Nature*, in which he describes a space having 137 dimensions.

The 137th dimension, says Sir Arthur, comes into theoretical physics in connection with problems involving the determination of the electric charge on an electron, called "e," and an electron's mass "m."

The ratio of e/m for an electron is a highly important number for the newer theories of physics. It has recently been suggested, declared Eddington, that when scientists set out to measure the ratio experimentally they really obtain a value just a bit smaller— $136/137$ of e/m .

His theoretical papers on the subject, reports Sir Arthur, have predicted values somewhat too large; in fact, $137/136$ of the correct result. This, he declares, is because his calculations did not take into account the 137th dimension, which must be used in dealing mathematically with a pair of indistinguishable particles.

If, in calculation, mathematicians pick out two particles fixed in position, and thus choose them as distinguishable, only 136 dimensions are needed. For

the more general case when any two particles are chosen, reports Eddington, the uncertainty of position adds the extra, 137th degree of freedom to the equations. Use 137 dimensions and everything will come out all right, he says.

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BOTANY

Eyes Upon the Ground Look Close at Beauty

See Front Cover

THE advantages of humility find ready proofs in almost anything of which we can get an enlarged view from beneath—a worm's-eye view. Seen from such an angle, and with such magnification, even so common a thing as the hoary head of a dandelion becomes as spectacular as a white peacock's tail, as frozen fireworks in fairyland. The perfect specimen shown on the front cover of this issue of the SCIENCE NEWS LETTER was photographed by Cornelia Clarke. You see these flowers on every roadside, but who realizes their beauty?

Science News Letter, July 7, 1934

PHYSICS

Five Globe-Trotting Instruments Leave Again

FIVE of Prof. Robert A. Millikan's globe-trotting electroscopes are going to the far ends of the earth to gather new cosmic ray secrets.

Dr. H. Victor Neher, colleague of Prof. Millikan in the recent cosmic ray studies at California Institute of Technology, is on his way to Rapid City, S. D., to install three of the instruments in the forthcoming National Geographic-Army Air Corps stratosphere flight of Captain A. W. Stevens and Major W. E. Kepner.

Two similar, self-recording instruments have been put aboard the S. S. Monterey, which has departed for the Antipodes. They will be cared for by the captain of the steamer.

The California cosmic ray instruments are encased in heavy shielding material to cut out all extraneous radiation from the highly penetrating cosmic rays. The record of cosmic ray intensity is recorded automatically on motion picture film inside the apparatus.

Already Dr. Millikan and Dr. Neher have obtained several hundred feet of cosmic ray film from balloon, airplane, stratosphere flights, trips through Canada, the United States, Central and South America, the Galapagos Islands, the Orient and a round-the-world-cruise.

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PHYSIOLOGY

Body's Ability to Store Oxygen May Help Fliers

AVIATORS preparing for high altitude flights may in future spend an hour or more in breathing pure oxygen before taking off. Experiments with rats at the University of Southern California show that by such means the animal body can store up oxygen against a time of need, such as mountain climbers and altitude fliers encounter.

Experiments substantiating this fact were reported by Prof. Francis Marsh Baldwin and Harold B. Robertson of the University's physiological laboratories at the meeting of the American Association for the Advancement of Science.

White rats, which have physiological responses very similar to man, were made to breathe pure oxygen for twenty-five, forty, seventy, and one hundred

and thirty minutes and were subjected to atmospheric conditions comparable to those found at altitudes of from six and one-half to eight miles.

Evidently the animals were able to store up some of the oxygen in their bodies, for these animals stand the high altitude atmospheric conditions longer than control animals that had not had pure oxygen to breathe first.

Seventy minutes of oxygen breathing gave the greatest resistance to subsequent oxygen-want in high altitude conditions. Twenty-five minutes was of considerable value. Forty minutes of oxygen breathing was of less value than either twenty-five or seventy, which the scientists explained as being probably due to a shift in body processes similar to the adjustment a runner makes when he gets his "second wind." Exposure to oxygen for longer than seventy minutes decreased the animals' ability to withstand the low barometric pressures.

Science News Letter, July 7, 1934

SEISMOLOGY

Will Make "Earthquakes" To Get Data on Real Ones

NORTHERN Wyoming is due for a series of earthquakes during the next thirty days, but no alarm need be felt. They are to be artificial earthquakes.

California Institute of Technology scientists, led by Dr. John P. Buwalda, geologist, and Dr. Beno Gutenberg, geophysicist, will create artificial shakes in the Big Horn Basin to study wave phenomena similar to those in real quakes.

The artificial quakes are produced by exploding dynamite in holes four or five inches in diameter and between twenty and fifty feet deep. The charge is exploded at the bottom of the hole, with the rest of the hole filled with water to concentrate the explosion.

Four super-sensitive seismographs, set up at varying distances from the center of the disturbance, are connected with a recording instrument in a special truck where the wave phenomena recorded by each instrument is recorded on the same tape.

Tests are being conducted in various parts of the country to study the wave effects upon rocks in different hardnesses. Three years ago similar experiments were undertaken in Yosemite Valley.

Science News Letter, July 7, 1934

IN SCIENCE

CHEMISTRY

New Kind of Gas Attack Protects Fruit From Decay

IF ORANGES are subjected to a new kind of protective gas attack, storage damage from decay is reduced to half or quarter of the usual losses.

The gas used by Dr. L. J. Klotz of the University of California's Citrus Experiment Station at Riverside, Calif., is nitrogen trichloride. It promises to combat decay-causing fungi upon citrus fruits in storage rooms or in loaded cars of packed fruits.

Very small concentrations of this gas do the work satisfactorily. Equivalent concentrations of chlorine gas, while more toxic to the fungi, injure the fruit rind and open the door to greater losses later.

Science News Letter, July 7, 1934

PUBLIC HEALTH

Baby Death Rate Can Be Reduced by Mother's Milk

MOTHER'S milk is the means to further reduction of the death rate among American babies, Drs. Clifford Grulee, Hayworth N. Sanford and Paul H. Herron of Chicago told members of the American Medical Association. They based this opinion on a study of 20,000 Chicago babies.

The mortality for these infants was ten times higher among those artificially fed than among those fed by their mothers in the natural manner, the baby specialists found.

The success of artificial feeding of infants during the past few years has made it seem that the prepared baby's foods can safely replace mother's milk, but there is no scientific proof of this, Dr. Grulee and associates declared.

Natural feeding by the mother gave greater resistance to infection than artificial feeding, the records of the 20,000 babies showed. Even partial breast feeding gave considerable protection against disease which the completely artificially fed babies did not enjoy.

Science News Letter, July 7, 1934

ICE FIELDS

AGRICULTURE

Irrigation Water Carries Plant Food With Drink

FOOD as well as drink for plants now flows in some of the irrigation ditches watering southern California farms. Instead of spreading nitrogen-containing fertilizer on soil, a little ammonia gas is allowed to mix with the irrigation water. Dr. Dean D. Waynick of Anaheim, Calif., has used this method in extensive trials and finds that plants thrive even better on their liquid nitrogen-containing diet than on solid fertilizer.

Dr. Waynick's experiments were reported to the meeting of the American Association for the Advancement of Science.

Science News Letter, July 7, 1934

ECONOMICS

Stanford Teacher Offers Chemical Theory of Money

THE TANGLE of money and prices that now confronts the world can best be explained by applying the principles of chemistry and psychology to economics, Prof. T. J. Kreps of Stanford University School of Business Administration told the economics section of the American Association for the Advancement of Science.

Offering a psycho-chemical theory of money, Prof. Kreps contended that the peculiar combination of variables in the interplay between money, credit and prices are somewhat like the interchanges of water in the forms of steam, liquid and ice.

Violent movements of prices and money are similar to a bubbling, steaming cauldron, while normal economic conditions are like still pools of clear water of slowly changing level. The chemical economic world is seasoned with the feelings, fears and aspirations of the people in it and this introduces a psychological factor.

Three other kinds of economic universes have been created in the minds of economists, Prof. Kreps said.

First, there is the universe of pure

magic, in which prices are supposed to rise when legislative bodies decree they shall. Second, there is the widely accepted brand of price money theory that Prof. Kreps calls Newtonian. In this all the factors supposedly add up. Inflating money so much is supposed to increase prices so much. Third, there is the coin-tossing kind of economics, an economic cosmos of pure chance where no one thing controls.

Prof. Kreps feels that his psycho-chemical interpretation fits the facts best of all.

Science News Letter, July 7, 1934

MEDICINE

Surgeon Tells How to Patch a Broken Heart

PATCHING and mending broken hearts is a job for surgeons and one to which they should give more attention, Dr. Claude S. Beck of Cleveland, told members of the American Medical Association.

Dr. Beck was not referring to the heart wounds made by Cupid's darts but to the tears, bruises and breaks which occur as the result of injury to the heart by other sharp instruments and bullets. Many of these can be repaired with the surgeon's needle, and Dr. Beck thinks that in the future new surgical methods will be developed for repairing heart injuries and correcting heart deformities, just as operations have been devised for injuries and deformities of other parts of the body.

The heart can take an enormous amount of injury and still recover, Dr. Beck and associate, Dr. Ernest F. Bright, found in a series of experiments to determine the effect of bruises on the heart.

Collisions, falls or heavy blows may injure the heart as well as bullets and knives, Dr. Beck pointed out. Injuries from the former causes have been rather overlooked, either because they produced no disturbance or because the symptoms they did cause were attributed to disease.

Dr. Beck reported the case of a man whose heart had been flattened by being kicked in the chest by a colt when he was a lad of four. He had been an invalid ever since, but Dr. Beck said that the condition, in his opinion, could have been corrected by surgical treatment shortly after the accident.

Science News Letter, July 7, 1934

PSYCHOLOGY

Mannose, Odd Sugar, is Both Sweet and Bitter

FOR EXTRA dessert at the biologists' banquet, a feature of the meeting of the American Association for the Advancement of Science, there was a strange sort of sugar, mannose, chemical relative of ordinary sugar.

The queer thing about it was that some of the banqueters could not taste it at all, some called it sweet, others pronounced it bitter, and still others thought it both bitter and sweet.

Dr. Albert F. Blakeslee, geneticist of the Carnegie Institution of Washington, could not resist an opportunity to use the feasting fellow-scientists as guinea pigs for his experiments on taste and smell. So he distributed little pellets containing measured amounts of mannose, whose differing taste effects had been called to his attention by Dr. C. S. Hudson, government authority on sugars.

Even the flowers used as table decorations were part of Dr. Blakeslee's experiment. Snapdragons were sniffed as an example of a weak smell, while golden gleam nasturtiums provided the sample of a strong smell which to most people is unpleasant.

The most striking substance which people taste quite differently is a white chemical, phenylthiocarbamide, violently bitter to some and quite tasteless to others. Dr. Blakeslee finds that ability to taste this chemical is inherited somewhat like eye color.

Science News Letter, July 7, 1934

BOTANY

Green Leaf Pigment Influences Plant Yield

THE AMOUNT of the green leaf pigment, chlorophyll, in part determines the yield of a plant, according to Drs. J. C. Ireland and Parks A. Yeats, plant physiologists of the Oklahoma Agricultural Experiment Station. Their experiments were performed on sorghum plants.

Although the amount of chlorophyll decreases as the grain hardens, it increases in kafir, a grain sorghum, until the time of seed maturity.

Different varieties of grain sorghum, they say, show characteristic differences, but these differences are constant throughout the life of a given variety.

Science News Letter, July 7, 1934

ASTRONOMY

Thuban Was Once the Pole Star

Faint Star in Little Dipper, Pointed to by Upper Stars in Big Dipper Bowl, Was North Star in 3500 B.C.

THE position of the north star, close to the place around which all the stars of the heavens seem to turn so that on any clear night it can be seen in the north in practically the same spot, is a well recognized symbol of permanence. But Polaris, our pole star, is only the temporary occupant of that place of honor. The "pointers" are the two stars, Merak and Dubhe by name, in the bowl of the great dipper opposite to the handle. A line from them indicates Polaris. But if you make similar use of the upper stars in the bowl, the pair nearest the handle, including the one where the handle joins the bowl, following it over to the right but not so far as to Polaris, you come to a rather faint star, and then still farther are two brighter ones, that form part of the little dipper. It is the faint one with which we are especially concerned now. It is part of the constellation of Draco, the dragon, and is known as Thuban.

About 3500 B. C., at the time of the building of some of the pyramids in Egypt, this was the pole star, and in the Great Pyramid there was constructed a long passage, slanting up to the north, so that the priests, from the inner recesses, could observe Thuban. Thus at least one use of the pyramid was as an astronomical observatory. Many of the Egyptian temples were built in such a direction that from the innermost holy of holies the priests could look out through doors and long rows of columns to the horizon at just the place where a certain star arose, the star dedicated to the god to whom the temple was held sacred.

But today Thuban is far from the pole. What caused it to move, and what brought the star which we call Polaris into its place? The answer is found in what the astronomer calls "precession." Because the earth is not truly spherical, but has a bulge around the equator, and because this bulge is pulled by the gravitational attraction of the sun, the direction that the north pole of the earth points in the sky does not remain in the same place but de-

scribes a large circle in the sky. Something similar may be observed with a spinning top when it is starting to "die." It then wobbles in a conical manner, and finally stops. But because of the relative smallness of the forces acting upon the earth, the change, or "wobble," is very slow, and it takes nearly 26,000 years for the cycle to be completed. In an ordinary lifetime, or even in several lifetimes, the change in the position of the stars due to precession is not noticeable; except with delicate astronomical instruments. Over millenia, however, it is marked, and the constellations have slipped around the sky, so that now Polaris occupies the place it does.

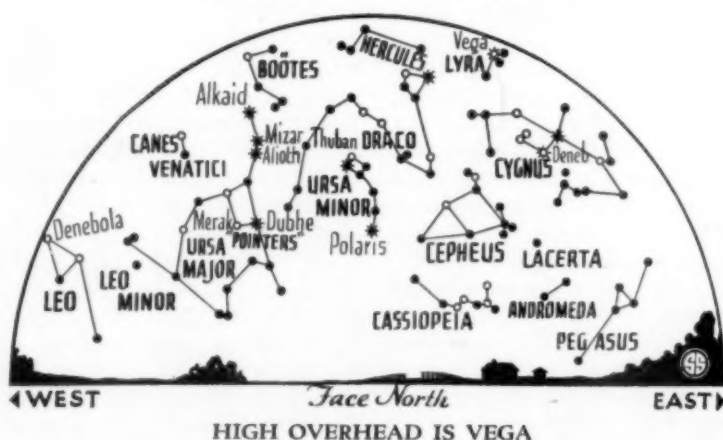
This change is still going on, which means that after a few thousand years Polaris will again be far from the pole. As a matter of fact, it is still approaching that point and about a century from now it will be even closer to it than now, though the difference will be very minute. For nearly ten thousand years there will be no bright polar star, but then it will come into the region of Deneb, the bright star in Cygnus. Deneb will then be many times as far from the pole as is Polaris. In the year 14,000 Vega, in Lyra, will be the pole star, only a few degrees away from the point,

the "center of the sky." Then, after the 26,000 years have elapsed from the present, the pole will be back among the same stars that it is now.

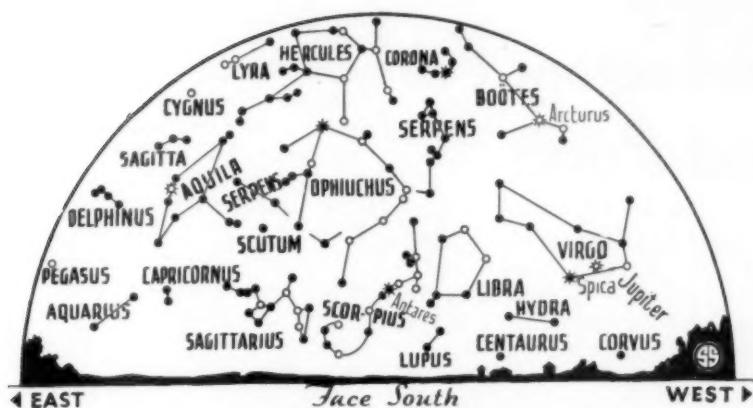
Another effect of this motion is to change the rising point of the stars. If a certain one rises today directly in the east, perhaps, a few hundred years from now it will rise a little to the north of east, and during the long precessional cycle, it may change by many degrees. The Egyptian priests found this out. When they built a temple that was oriented to a certain star, it did not remain so pointed, so in some cases they proceeded to build a new temple, at an angle slightly different from the old one. And in some cases a temple originally erected for one star was found, after many centuries, to be pointed to another, and when this happened, they again made use of it in their ceremonies. Such changes have a practical application to the Egyptologists, for when a temple was oriented to a particular star, and the identity of the star is known, as it often is from inscriptions, then the astronomer can figure out just how long it has been since the star did rise in that direction. Astronomy and archaeology may seem to be the most remotely connected of all the sciences, but by means of the former, the student of the latter is often able to date historic occurrences.

One interesting astronomical event or the month will be visible, in the United States, only to people in the

• • • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



Look in the eastern evening sky for a large triangle of bright stars. Brightest of these is Vega, second brightest of stars to be seen from most of the United States.



SCORPIUS IN THE SOUTH

Low in the south, with tail curving eastward, is the giant writhing constellation Scorpius, the scorpion. The creature's heart is marked by the bright red star, Antares. Westward is seen the brightest object in the sky this month, Jupiter.

far west. This will be an eclipse of the moon on July 26, when our satellite will partly enter the shadow of the earth. The beginning of the eclipse will be visible quite generally in all parts of the Pacific Ocean and around its eastern and western shores. For Californians, the moon will set before it is over, so they will not see it all. The ending of the eclipse will be visible as far east as the Indian Ocean and central Asia. When at its height, just two thirds of the moon's diameter will be immersed in the earth's shadow, so that one edge will appear noticeably darker than the other, and perhaps will be of a red color.

Perhaps to make up in a measure for their failure to see the eclipse, the residents of the central and eastern parts of the United States will see another kind of eclipse, by the moon, which will not be visible to the westerners. On July 24 the moon will eclipse the bright star Nunki, known to the astronomer as sigma Sagittarii. Such an "eclipse" is more properly called an occultation.

The constellation of Sagittarius, the archer, is in the southeastern sky these evenings, immediately following the tail of the scorpion. In it is the familiar group known as the "milk dipper." The handle of the dipper points up and to the right, and the bowl is turned downwards. The dipper is a smaller one than either of the two in the north sky. Nunki is the uppermost, and brightest, star in the bowl. It is of the second magnitude.

As seen from Washington, D. C., the moon will pass in front of the star at 8:20 p. m., eastern standard time, and the star will emerge from its hiding at 9:34 p. m. Because of the fact that

the moon will then be just two days before it is full, it will be quite bright, and the star will not be as conspicuous as it is at other times. But a small telescope, or a pair of binoculars, should easily reveal the star up to the moment when it suddenly vanishes as it disappears in back of the dark edge of the moon. In places west of Washington the occultation will be earlier than the times mentioned and in the northeastern part of the country it will be a little later. Observations of occultations are regularly made by astronomers because they afford an excellent means of checking the motions of the moon.

Nunki is the brightest star that is so hidden this year, as seen from any part of the United States, but its occultation this month is really an encore. It was previously occulted on May 31.

Jupiter is the only planet visible this month in the early evening sky, when it can be seen brilliantly in the southwest. Later in the evening Saturn comes into view, rising about ten o'clock, standard time, in the beginning of the month, and two hours earlier in the end. Mercury will be at its greatest distance west of the sun on the 31st, and may then be seen low in the east before sunrise. Venus and Mars will also be visible

in the early morning, but the latter will be much the fainter, and more difficult to see.

July brings to the eastern evening sky a large right triangle of bright stars, which, during the coming months, will gradually move over to the west.

High overhead is Vega, second brightest of the stars to be seen from most of the United States. Below, and to the north, is Deneb, marking Cygnus, the swan. This group is also called the Northern Cross. Deneb is at the head of the cross, now seen on its side, while the upright of the cross goes towards the south. About as high as Deneb, but farther south, is Altair, part of Aquila, the eagle. Low in the south is a star distinctly red in color. This is Antares, forming the heart of Scorpius, the scorpion. The tail of the creature curves to the east, and then up, like a gigantic fish hook, while the claws are formed by a curved row of stars to the right of Antares.

Well above Jupiter is another brilliant star, Arcturus, marking the group of Bootes, the herdsman. Low in the west, just ready to set, is Leo, the lion, with the first magnitude Regulus.

Looking to the northwest, we see the Great Dipper, forming part of the great bear, Ursa Major. The handle of the dipper is uppermost, below are the pointers, the two stars of the bowl which indicate the direction to the right at present, of the pole star, Polaris. This is close to the north pole of the sky, the point about which the whole sky seems to turn. In the northeastern sky, on the side of the pole directly opposite to the great dipper, is the W-shaped constellation of Cassiopeia, representing a queen seated on her throne.

Science News Letter, July 7, 1934

The Federal Government has spent \$1,184,160,000 for highways since 1927, but has derived in taxes upon gasoline, motor vehicles, oil etc., \$1,461,444,000.

Phases of the Moon

		E.S.T.
Last Quarter	July 3	3:27.9 p. m.
New Moon	July 11	12:5.9 p. m.
First Quarter	July 19	1:52.9 p. m.
Full Moon	July 26	7:8.6 a. m.

BACTERIOLOGY

Silver Acts as Disinfectant For Drinking Water and Pools

ONE PART of pure silver in a quarter billion parts of water may eventually take the place of chlorine and oxygen as a disinfectant for swimming pools, artificial ice or drinking water. Minute quantities of this valuable metal added to water may form highly bactericidal solutions for washing and disinfecting purposes.

The Katadyn process for activating water with silver originated in Germany and it promises to have industrial uses. In dairies and breweries the bacteria-killing, activated water may be utilized. Investigators report that in any place where the growth of bacterial organisms takes place, such as the algae in cisterns and condensers, the Katadyn method could be used to advantage.

The silver activation process is relatively simple and lends itself to the treatment of quantities of water as large as a city supply at small cost. The actual cost of the silver added to the water is less than that used for coating the plates which are used as electrodes. The activation is carried on by a small tank-like apparatus installed in the supply pipe. In this tank are silver-coated plates, very similar in arrangement to those in a storage battery or radio condenser. An electric current of less than two volts potential is sent through the water passing by the plates, forcing silver ions into solution.

The life of the plates is determined by how deeply they are coated and the amount of silver discharged into the stream. One pound of pure silver is enough to activate nearly half a million gallons of ordinary, soft spring water.

Many silver compounds are highly injurious to human life. Silver nitrate, commonly known as lunar caustic, is frequently used in "burning off" skin ailments such as warts, while argyrol, a more dilute form of the same salt, is not to be taken internally although it is used in relieving throat and other inflammations. However, metallic silver has been found to be an entirely safe bactericide, the concentration necessary for the slaughter of microbes being much lower than one dangerous to human life.

As early as 1893 a Swiss scientist named Carl Wilhelm Naegeli doing botanical research work in Munich discovered that water in contact with pure silver or copper kills bacterial life. For this action Naegeli coined the word oligodynamic, meaning little (oligos) having much power.

Swimming pools and ice are almost everywhere considered to be more or less contaminated with microbe life. A large bathing pool in Germany is reported to have remained free from bacteria for weeks after the water was activated. The water from melting "activated ice" has also been found to kill germs introduced into it.

The Katadyn Process has not as yet been used to any extent in this country, but it is understood that contracts are being let for its installation.

Science News Letter, July 7, 1934

PHYSICS

Neutron May Not be Real Ultimate Particle of Nature

WHILE the newly discovered particle of matter, the neutron, has no electric charge that can be detected, new suspicions indicate that it may be composed of the close combination of a positive electric charge, the proton, and a negative electric charge, the electron.

If this is true the neutron would not be a real elementary particle of nature but a very stable combination of two things already known.

Prof. Alfred Lande, Ohio State University, reported to the American Physical Society meeting in Ann Arbor, Mich., that new considerations regarding the magnetic properties of atoms indicate the negative charge is bound to the lighter of two things inside a neutron, while the positive charge is joined to the heavier part. Thus the neutron would be a particle which represents a working agreement between a proton and an electron.

The principal difficulty in considering a neutron as composed of an electron and a proton comes in a study of their weights separately and in combination. The sum of the masses of a proton and

an electron would be 1.0072 plus .00055, or 1.00775. This figure is larger than the mass of the neutron, 1.0068, determined experimentally by Prof. James Chadwick of Cambridge University, England, but is smaller than the neutron mass, 1.010, as measured in Paris by Irene Curie and her husband, F. Joliet.

If 1.010 is correct, physicists have been anticipating trouble, for they then would have two atomic objects weighing less in combination than their sum separately.

Dr. Lande's magnetic considerations, tackling the problem from another front, indicate that the neutron is a proton plus an electron and implies that the Curie-Joliet measures of 1.010 for the neutron mass may be in error.

Science News Letter, July 7, 1934

PHYSICS

Atomic "Bullets" Travel At 174,840 Miles A Second

NEGATIVE particles of electricity—the electrons—are being "kicked" down evacuated glass tubes at the University of Virginia with speed reaching 94 per cent. that of light, the fastest thing in the universe. Light travels 186,000 miles a second or 667,600,000 miles an hour. Electrons speeded up in the apparatus of Prof. J. W. Beams and H. Trotter, Jr., have reached velocities of 174,840 miles a second.

Reporting their experiments in *The Physical Review*, the Virginia scientists describe their method for obtaining very high speed particles for use in research on bombarding atoms where large energies of impact are required.

Electrons having kinetic energy comparable with that achieved if a million volts of storage batteries were connected in series, are obtained by the use of only 300,000 volts alternating current from power lines. Or, if a small Van de Graaff type electric generator is employed, electrons having energies well over a million volts are obtained with only 30,000 volts. The apparatus for this last case boosts up the energy by a factor of over 40.

The scientific trick in the method, which makes the high energy gain possible, is to apply the small voltages at just the right times as electrons fly down the tube. Each electron passes by a series of electrodes and is speeded up step-by-step on its journey to the far end of the apparatus.

Science News Letter, July 7, 1934

PHYSICS

Scientists Still Differ Concerning Cosmic Rays

Their Nature and Manner of Creation as Well as Place of Origin Uncertain Though Experiments Agree

COSMIC RAYS, after years of observations by some of the most brilliant physicists in the world, still constitute one of science's major mysteries. It is as though men were not sure that the sun's rays are light, or that rain is water.

Not only is the nature of the cosmic rays a matter of opinion but science does not know from whence they come, nor how they are created. The one unchallenged point about the rays is that they bombard the atmosphere of the earth and every plant or animal which lives on its surface unceasingly and unvaryingly.

Dr. Robert A. Millikan, of California Institute of Technology, a cosmic ray pioneer, presented to the American Physical Society meeting in Berkeley, Calif., his interpretations which remain steadfast to the idea that cosmic rays are mostly photons; that is, they constitute a phenomenon like ordinary light, heat and X-rays.

Dr. Thomas H. Johnson, assistant director of the Bartol Research Foundation of Philadelphia's Franklin Institute, had previously told the gathered scientists his experiments could best be interpreted, in his opinion, by assuming that cosmic radiation consists of particles, predominantly the nuclei, or hearts, of atoms.

Experimentally cosmic ray observations are now in good agreement among the various investigators. It is in the interpretations of the observed data that opinions and theories differ. Scientists are not worried by a multitude of theories, however, for they know that adequate explanations will be reached more surely because of them.

Dr. Millikan concludes that practically all the electrical "fuss" kicked up in the earth's atmosphere by cosmic rays is due to the passage of positive and negative electrons, most of these particles being born of photons and electrons in the atmosphere.

Dr. Millikan finds that not more than three or four per cent. of the cosmic

ray electrical disturbance, or ionization, found at sea level is due to electrons that come in from outer space; nevertheless, he believes that these electrons are responsible for the variations in cosmic ray intensities found over the various parts of the earth.

Dr. R. M. Langer of California Institute of Technology, suggested that it may be necessary to credit cosmic ray effects to some kind of radiation yet unappreciated in order to obtain an adequate explanation. Perhaps even the newly discovered neutron may play a part.

The most easily seen and captured light coming from the stars and nebulae of the heavens also contains scientific mystery.

Realization is growing that the vast spaces between the great star systems, the nebulae, are not entirely empty but contain a "cosmic haze" composed of extremely diffuse atoms. Sodium and calcium "fog" of this sort has been detected by the fact that inter-nebular dust filters out some of the light from the objects behind it.

What is the most plentiful material in the distant parts of the universe is another great problem of science. Dr. Donald Menzel of Harvard College Observatory finds evidence for larger amounts of neon and fluorine occurring in novae, or momentary brilliant stars that flare up to great brightness for a year or two and then dwindle to their former orthodox intensity. Other astronomers find that the recognized large amounts of hydrogen and helium in the stars and nebulae sometimes masquerade in greatly agitated states as other elements.

Science News Letter, July 7, 1934

Grapefruit rind yields essential oils which are found to be valuable in perfume and flavor manufacture.

A North Carolina post office has been equipped with "electric eyes" in the sorting room, to maintain correct light for the work, regardless of weather.

PALEONTOLOGY

NATURE RAMBLINGS by Frank Thone



Dinosaur Eggs

FOR many years after scientists had pieced together the fossil bones of dinosaurs and had reconstructed a good deal of the natural history of these monster reptiles, the question of how little dinosaurs first saw the light remained a persistent and perplexing riddle. It was assumed that they hatched from eggs, because hatching from eggs is the orthodox method for coming into the world among the reptiles we know today. But in all the great deposits of dinosaur bones in America and Europe, which yielded many tons of fossil skeletons, nobody had ever found a single dinosaur egg.

Then came the day when scientific parties could take the field as though they were military expeditions or engineering enterprises, with men, equipment and money enough to work on a really large scale. One of the first fruits of one of these expeditions, under Roy Chapman Andrews of the American Museum of Natural History, was the discovery of dinosaur eggs in abundance, under the sands of the Mongolian desert. He found them not merely singly, but as whole nests or "clutches," where they had been sifted over and prevented from hatching by drifting dust.

The eggs of these monster reptiles were not so large as might have been anticipated, judging by the huge bulk of their parents. Their shells were comparatively thin, and had a pebbled, leathergrained kind of surface. But Mr. Andrews was not the first man who ever saw a dinosaur egg. His discovery was anticipated, by at least 25,000 years. For in the same desert he found fragments of dinosaur eggshells that had been bored as pendants for the necklace of some caveman chief!

Science News Letter, July 7, 1934

ASTROPHYSICS

"Heavy-Weight" Stars May Be Composed of Neutrons

THE SUPER "heavy-weight" stars of the universe, some of which are 50,000 times as dense as water, may be composed of neutrons. Neutrons are the newly-discovered non-electrical particles of matter which are far smaller than the tiniest atoms—hydrogen—and yet have about the same mass. This is the new theory advanced by Dr. W. Baade of the Carnegie Institution's Mt. Wilson Observatory and Dr. F. Zwicky of the California Institute of Technology in a report to the National Academy of Sciences.

The hitherto baffling fact about the heavy-weight stars, like the white dwarf companion of Sirius, is that they are only about as large as a planet but weigh as much as the sun. They have an almost incredible amount of matter packed into a small space.

The suggestion that the very dense stars are composed of the heavy but small neutrons is put forward by the Pasadena scientists because the tiny neutron specks would pack tightly and allow much more than the normal amount of matter to be pressed into a given volume. Electrical repulsion between normal atoms places a limit on this packing capacity in the usual stars.

The time when an ordinary star changes into a "neutron star," declare Drs. Baade and Zwicky, may be during the rare transition of the stellar

objects into what scientists call a super-nova.

About once in a thousand years in any given system of stars like our Milky Way some one star will "go wild," so to speak, and flare up so that its brightness increases tremendously. On occasions super-novae outside our own star system have been as bright as Venus. Then after a year or two the super-novae fade back into their former obscurity.

It is during this final eruption of the super-nova that the change may be occurring from an atom to a neutron star. The phenomenon might be likened to a man who has one final fling at life before settling down to a stable, sedentary old age.

Science News Letter, July 7, 1934

PSYCHOLOGY

Personality Measured On Seven-Point Scale

PERSONALITY is not the vague, mysterious "gift from the fairies," that many suppose it, but is a tangible, measurable aspect of character made up of seven factors, Dr. William S. Casselberry, director of the Psychological Service Center, Los Angeles, told members of the American Association for the Advancement of Science. Personality is not a spell cast over others, Dr.



RECENT ARCHAEOLOGICAL WORK IN THE UNITED STATES

an address by

Frank N. Setzler

Assistant Curator of the Division of Archeology, U. S. National Museum

Wednesday, July 11, at 3:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

Casselberry said.

"What influences you to like or to dislike another person is everything about that person which you can see, feel, hear, taste, or smell. Personality is the way we look, the big and little things we do, the odors we disperse, and everything else another person notices."

The seven factors of personality, as defined by Dr. Casselberry are: vitality; appearance, including clothing, face and hair, carriage and figure; voice; poise; conversation, including fluency and interest; success in vocation; presence or absence of personal problems.

Measurements of seventy patients on these seven points showed a similarity between the results obtained and their scores on a psychiatric measure of personality, which takes into account the individual's self-sufficiency, his tendency to dominate, and his self-centeredness or lack of it. This similarity indicates that the people who make a good impression tend to have good mental and emotional characteristics.

To determine whether the converse is also true, Dr. Casselberry studied the persons who had written letters to him asking for assistance with personal problems. He wanted to know whether those who are in trouble, facing divorce, unemployed, unable to enjoy social life, unhappy and maladjusted, would make a poor impression on others and have low personality ratings.

Results indicated that those with low standing on the personality test have many personal and social problems. Dr. Casselberry concludes that personality can be measured with sufficient accuracy to provide a sound basis for psychological treatment.

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GEOLOGY

Bahamas May Have Been Part of American Continent

NEW evidence that the Bahama Islands had a continental connection in past geologic times was reported by a joint Harvard and Yale expedition which has recently returned from a voyage to nearly 40 West Indian islands which have hitherto been extremely inaccessible and several of which have never before been visited by naturalists. The chief evidence lies in the discovery of mammalian remains in caves used as dwelling places by prehistoric man on islands where as yet no evidence has been found that mammals existed.

People living under almost primitive conditions were found inhabiting small islands off the coast of Haiti and San Domingo. But little is known concerning these communities which have been rarely visited. The fauna found in this region was not as sparse and depauperate as has been generally supposed.

The cruise was made this spring on the yacht *Utowana*, by Dr. Thomas Barbour, professor of zoology at Harvard and director of its zoological museum. He was accompanied by Mrs. Barbour, Mr. and Mrs. J. C. Greenway

of the museum staff, and Froelich Rainey of the Peabody Museum of Yale University, who served as archaeologist to the party. The expedition was financed by the two universities and was aided by the loan of the yacht by Allison V. Armour.

A colony of small guinea-pig-like rodents was re-discovered and several excellent specimens of this animal were captured. Several snakes, lizards and many land shells, all evidently completely unknown species, were also collected.

Very large collections were also obtained of reptiles and of insects of various orders. A number of new and significant species have already been found and more discoveries are expected. Various types of wild cotton growing on several of the islands were also collected by Mrs. Barbour, and seed of many plants were also gathered. Botanical specimens of several new types are likewise included.

A number of scientific reports covering the expedition more completely are now being prepared by the members of the party.

Science News Letter, July 7, 1934

ENGINEERING

Hybrid Trolley Car-Bus Uses Either Current or Gasoline

RAISING a trolley pole to an overhead wire is a new feature in bus transportation which makes the "trackless trolley" a hybrid resembling even more closely the nearly archaic "car" of Toonerville fame.

Years ago, when buses in competition with street cars were an innovation, the motor bus was a radical departure from rail traction. Now that they have become modernized, the newest ideas seem to have been reclaimed from the past.

After motor buses became an accepted means for inter-urban travel, the direct engine drive was superseded by gas-electric installations, which, because of greater power and ease of handling, permitted the use of larger and more luxurious buses. The latest develop-

ments cause a modern bus to resemble once more the old-time trolley car when it comes to a steep hill. A pole from the roof accepts overhead power to supplement the gas-electric power plant.

Trolley car companies on the verge of bankruptcy from bus competition are highly in favor of this scheme, it is reported, since it allows them to find a profitable use for at least a part of their equipment.

The advantages to the commuter are also apparent. The trolley bus is quiet and smooth. It can travel at greater speed than a trolley car and has a much greater acceleration. On the other hand its path is not limited to a metal track and passengers no longer find it necessary to endanger their lives by stepping

out to the middle of a crowded thoroughfare. The trolley bus can easily sweep in to the curb and pick them up in safety.

Martin Schreiber, manager of Public Service Coordinated Transport in Newark, N. J., reports a successful trial of the "All Service Vehicle." The bus was connected electrically to overhead wires at the foot of a long steep hill up the Hudson River palisades. With engine shut off the heavy vehicle proceeded up the grade, passing nearly all the cars on the road. At the top a button was pressed, the trolley pole came down automatically, and the bus resumed its gas-electric drive without a moment's delay.

Science News Letter, July 7, 1934

ARCHAEOLOGY

Science Links Living Indians And Mystery Ruins

MYSTERY that surrounds the abandoned ruins of Casa Grande and Indian villages scattered in the Gila Valley of Arizona was lightened by a discovery announced by Arthur Woodward of the Los Angeles Museum.

Speaking before the American Association for the Advancement of Science, Mr. Woodward told of conclusions reached from examination of burials of the Indians who built the remarkable Arizona ruins. Some of the funeral customs are revealed as very much like customs still followed by Yuma, Mohave, and other Indian tribes of the Colorado basin and the hills of southern California. It is believed that the customs have survived, and are evidence linking the ancient people historically with the present.

Hohokam Indians, as the ancient and unknown people have been named, had no less than three forms of cremation burial in the course of their history. These funeral customs changed and became simpler as their beliefs changed, Mr. Woodward infers. The second type was the one which somehow spread to California and has survived. In this type of funeral the bulk of the bones were buried in large jars, and the offerings were fewer, and inferior to the elaborate provisions thought needful in their earlier age.

The discoveries which provide evidence of customs of the Hohokams were made near Coolidge, Arizona, by the Van Bergen-Los Angeles Museum expedition.

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●First Glances at New Books

Medical History

YELLOW JACK—Sidney Howard in collaboration with Paul De Kruif—*Harcourt, Brace*, 152 p., \$2. This is the remarkable and highly-praised play, recently produced in New York, in which Sidney Howard tells the dramatic story of the fight against yellow fever. The construction of the play is unusual. There is no division into acts and no curtain falls between the scenes. The play begins at the end of the story in a London laboratory where in 1929 steps are being taken toward production of a yellow fever vaccine. Next the action moves back to 1927 to the African laboratory of martyred Adrian Stokes, who first gave the disease to a monkey, thus providing scientists for the first time with a non-human guinea pig for their investigation. From Africa the play goes back to the U. S. Army camp in Cuba in 1900 where Walter Reed and his associates of the Yellow Fever Commission performed their daring experiments on human volunteers which proved that the mosquito carries the disease. The scientist or the layman with some knowledge of science and scientific ways of doing things will find this a stirring play to read or to see. But the problem does not seem to be put clearly enough for the layman with no scientific background. This type of reader or playgoer is more apt to be confused than thrilled.

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Astronomy

L'UNIVERS EN EXPANSION—Sir Arthur Eddington—*Hermann et Cie.*, Paris, 162 p., 15 fr. A translation by Prof. J. Rossignol, of Eddington's book, *The Expanding Universe*.

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Dietetics

THE PROFESSIONAL TRAINING OF THE HOSPITAL DIETITIAN—Helen Clarke—*Teachers College, Columbia University*, 96 p., \$1.50.

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Physics

EXPOSÉS DE PHYSIQUE MOLÉCULAIRE; LA FLUORESCENCE DES MOLÉCULES DIATOMIQUES—P. Swings. Pt. V., 37 p., 10 fr., Pt. VI, 35 p., 10 fr.—*Hermann et Cie.*, Paris.

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Physics

EXPOSÉS DE PHYSIQUE GÉNÉRALE: Pt. I, LES IDÉES D'EDDINGTON

SUR L'INTERACTION ÉLECTRIQUE ET LE NOMBRE 137—Jean Ullmo, 26 p., 7 fr.; Pt. II. **SUR LE PROBLÈME DU DÉTERMINISME**—Sir Arthur Eddington, translated by Dr. Eugène Neculcea, 25 p., 6 fr.—*Hermann et Cie.*, Paris.

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Sociology

THE CASE FOR STERILIZATION—Leon F. Whitney—*Stokes*, 309 p., \$2.50. The author tells very simply what sterilization is, why he and many other people favor it, and how they meet the objections commonly raised by those opposed to the measure.

Science News Letter, July 7, 1934

Physiology

THE HUMAN BODY, ITS STRUCTURE AND ACTIVITIES AND THE CONDITION OF ITS HEALTHY WORKING—H. Newell Martin—*Holt*, 701 p., \$4. Twelfth edition, revised by Ernest G. Martin. This physiology textbook includes much material that is ordinarily taught as hygiene.

Science News Letter, July 7, 1934

Technology

ENGINEER-CUSTODIANS MANUAL—Thomas J. Brett—*American Technical Society*, 184 p., \$2.50. Examination questions and answers for engineers, custodians, firemen, building superintendents, etc.

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Sociology

AMERICAN SOCIAL PROBLEMS—Walter Greenwood Beach and Edward Everett Walker—*Stanford University Press*, 391 p., \$2.10. A simply worded textbook intended to give the pupil a broad survey of the many problems developing as a result of the processes of change now altering American society.

Science News Letter, July 7, 1934

Social Hygiene

NEW PATTERNS IN SEX TEACHING—Frances Bruce Strain—*D. Appleton-Century*, 241 p., \$2. This book is not the technical treatise that its title suggests, but a simple and very practical handbook which should be helpful to parents, teachers and others entrusted with the guidance of children.

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General Science

THE NEW INTERNATIONAL YEAR BOOK, 1933—Frank H. Vizetelly, editor—*Funk and Wagnalls*, 856 p., \$6.25. Probably at no time since he began to edit this series of annual encyclopedias has the veteran lexicographer whose name appears on the title page has so exciting and event-packed a year to chronicle. Science, both in new discovery and in application of already known principles, has vied with economics and politics for place at the head of the column; and in his book Dr. Vizetelly has given science its due recognition.

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Education

THE ROLE OF THE TEACHER IN PERSONNEL WORK—Ruth Strang—*Teachers College, Columbia Univ.*, 332 p., \$2. In these days of crowded classrooms, emphasis is needed on the individuals who make up the class group. This volume will aid the teacher to understand and guide the young developing persons under her direction.

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Psychology

YOGA AND WESTERN PSYCHOLOGY: A COMPARISON—Geraldine Coster—*Oxford*, 249 p., \$2. Ancient Eastern mental and spiritual discipline are compared with recent Western "analytical therapy" by a Western scholar, who concludes that while neither has yet achieved the full possibilities of human consciousness, "the wisdom and genius of the two combined might accomplish what neither can do alone."

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Archaeology

ARCHAEOLOGICAL SURVEY OF DEARBORN AND OHIO COUNTIES—Glenn A. Black—*Historical Bureau, Indiana*, 70 p., 32 pl., free. This monograph, the April 1934 number of the *Indiana History Bulletin*, continues the reporting of the archaeological survey of Indiana. Excavation of two of the peculiar stone mounds of this region is described, and interesting possibilities of tracing Mound Builder relationships by excavations in these counties are discussed.

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